

# PURE MATH 945: CATEGORY THEORY AND HOMOLOGICAL ALGEBRA

- Professor: Jason Bell
- Office: MC 5008
- Lectures: TTh 9:30–10:50 in MC5501
- Office hours: Tu 11–12.
- Email: [jpbell@uwaterloo.ca](mailto:jpbell@uwaterloo.ca)
- Text: Eisenbud's Commutative Algebra
- Course website: <http://www.math.uwaterloo.ca/~jpbell/945F2019.html>

## MATERIAL

Categories and functors, natural transformations, the opposite category, adjoints, tensor-Hom adjunction, Yoneda's lemma, initial and terminal objects, limits and colimits, Govorov-Lazard theorem and filtered subcategories, Abelian categories, Mitchell's embedding theorem, Projective modules and vector bundles, injective modules, complexes, long exact sequences, homotopies of complexes, projective resolutions, derived functors, Ext and Tor, Ext via Yoneda equivalence.

## DETERMINATION OF GRADES

Grades will be determined from the following data:

- assignments (60%);
- final project (40%).

Assignments will be posted on the course website. Your assignment grade will be determined by averaging the grades from *every* assignment. Assignments are to be handed in at the end of class on the day they are due. Late assignments will not be accepted without a very compelling excuse. The final project will be due on December 5 by 5 pm.